

JUNE 1957



Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

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★ THIS MONTH ★

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SAFETY RECORD.—During 1956, SCS employees worked almost 29 million man-hours with only 119 disabling accidents. This was a frequency of 4.12 accidents per million man-hours of exposure. More than 10,000 automobiles and trucks were driven about 92 million miles with only 347 accidents. This was a frequency of .38 accidents for each 100,000 miles driven.

STUBBLE MULCHING FOR DRY YEARS.—During dry seasons stubble mulching has shown a definite superiority over plowing and clean cultivation for corn at Lincoln, Nebr. In 3 dry years (1939-41), stubble mulching gave average corn yields of 31.1 bushels per acre, compared to 18.7 bushels for plowing. In 3 wet years (1942-44), however, plowing and clean cultivation was better—73.7 bushels compared to 62.2 bushels for stubble mulching.

—Nebraska Experiment Station Quarterly

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Single rows of sunflowers, about 30 feet apart, serve as shelterbelts to protect loose muck soil and young bean plants from severe damage by wind erosion in the Lake Okeechobee area of Florida.

—Photo by Leon J. Sisk

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Operation Wildlife

By DURWOOD E. BALL

A BOMBING and gunnery range is a haven for wildlife, and is also a recreational area as a result of "Operation Wildlife" of the 4004th Air Base Squadron, on Matagorda Island, Tex.

An agreement between the Air Force and the Calhoun-Victoria Soil Conservation District, in 1955, enlisted the technical assistance of the Soil Conservation Service in planning the best land use for the Island consistent with its primary role in Air Force training.

A survey of the 36-mile-long strip of land off the Texas coast revealed a high potential for wildlife production coupled with livestock grazing. Major R. E. Freeman, base commander, launched the wildlife operation for constructive development of the land with a minimum of interference from the necessary bombing and gunnery practice.

The results won the Air Base Squadron a special plaque under the Frank A. Wood Wild-

life Award program for 1955 and, in 1956, the Copano Bay Soil Conservation District presented the squadron with a Lion's Club plaque for outstanding work in the field of wildlife conservation.

With the help of soil conservationists, Major Freeman and Captain Byron Clark, Special Services officer, made a careful inventory of the wildlife on the island and its habitat needs.

The survey showed a great need for protective cover for quail. Resting and roosting cover was especially deficient.

There were a few turkeys on the island, but predators were taking a heavy toll because of lack of roosts, since the island is practically treeless. Migratory birds needed additional fresh water and food.

Deer were plentiful but small in size. The deep, sandy soil of the Island is low in fertility and the forage produced is low in nutritional value.

The survey revealed that a great deal could be done to improve wildlife habitat with little

Note.—The author is work unit conservationist, Soil Conservation Service, Refugio, Tex.



Quail flushed from covert on Matagorda Island.

cost and a lot of work. Accordingly, a conservation plan was prepared. Upon its approval by the Air Force and the soil conservation district, the program was underway.

Although little could be done about the inherent qualities of the soil, the quality of forage could be improved by better range management and fertilization. Good range conservation practices, including proper livestock use, were made a part of grazing leases. The improved range management has benefited the ranchers as well as wildlife.

Grapevines were set out along fence lines to provide cover for quail, while 3,000 salt cedars were planted in 68 small fenced areas. In other places, brush was stacked in tepee fashion leaving open space underneath for the quail. Other coverts were made of discarded bomb crates. More than 200 cover areas were provided. Most of them were promptly occupied by quail—some within a few hours after completion.

Twenty turkey roosts were erected and now are being used by turkeys. Oil drums cut in half were welded to the legs of the roosts to prevent ground predators from molesting the birds. The turkey population has increased since the beginning of the program.

Five areas totaling 220 acres were fenced and planted to ryegrass and oats to provide feed for migratory waterfowl as well as resident wildlife. Some of these areas will be planted later to blue panicum (a perennial grass adapted to island conditions). Deer eat the forage read-

ily; quail and turkey like the seed; and geese browse the roots and tender shoots.

In other areas, the soil was harrowed or disked to encourage growth of annual weeds like croton and sunflower. These areas have provided feed for turkeys, quail, and mourning doves. Twenty-seven fresh-water ponds were created by deepening depressions and building dams. This has insured more and longer-lasting supplies of fresh water for waterfowl.

Walkways or dams, built to serve as crash-access roads for the Air Force, have cut off some of the inland swales, thus providing more areas of fresh water.

Trial plantings were made of two salt-tolerant grasses: meadow foxtail and Mediterranean saltgrass. Other trials of multiflora rose and anil indigo were made in an attempt to provide a constant cover and food supply.

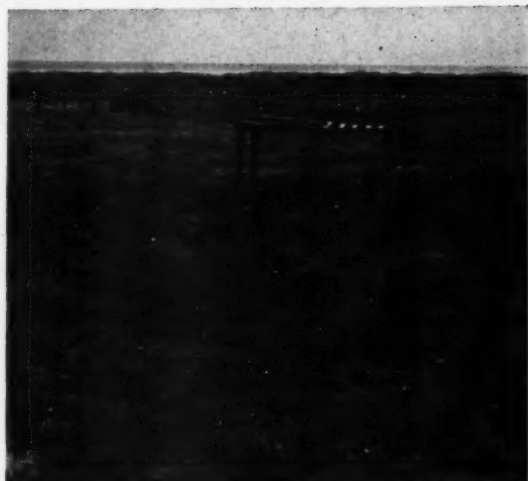
Proper harvest is also a part of the wildlife program. Hunting was a type of recreation that many of the Air Force men had never had the opportunity to enjoy.

Hunting blinds were constructed in the base hobby shop. Fifteen 2-man blinds accommodate 30 hunters. By limiting the amount of hunting, each individual is assured better hunting, and waterfowl have sufficient undisturbed fresh-water areas.

Deer have increased considerably during the past year, a large number of twins being born. An inventory of the deer each year will be the basis for deciding the number to harvest. This



Waterfowl rising from fresh water area on Matagorda Island.



Turkey roost in foreground, quail covert in background on Matagorda Island, Tex.

number will be governed by recommendations of the State Game and Fish Commission.

The installation of two fishing piers, one on the Gulf and one on the bay side of the island, has provided excellent fishing.

Officials of the Texas Game and Fish Commission, the U. S. Fish and Wildlife Service, the Aransas National Wildlife Refuge, and the Soil Conservation Service have been consulted throughout the planning and application of this program.

THE NARAHARAS OF HAWAII

Iwao Narahara, a director of the South Oahu Soil Conservation District, believes in his soil conservation program. Lettuce planted across the slope in small plots and parsley planted on the contour keep soil losses to a minimum even when heavy rains come.

In 1947, a heavy, flooding rain hit his lettuce field just after it had been plowed. "Loose soil flowed off the field and down the drain like so much mush," Mr. Narahara said.

Soon after that, he heard about the Soil Conservation Service and its technical assistance to farmers through Soil Conservation Districts. In 1952, the South Oahu Soil Conservation District was organized and his farm was one of the first to get help.

The lettuce field is now plowed in small plots, with a diversion ditch made above each plot before it is plowed. "I won't leave it plowed for one night without protection from overflow water," Iwao says.

All hillsides are planted in panicum grass so no erosion takes place. The parsley is planted on the contour where little if any soil ever leaves the field.

High producing, first-quality lettuce is harvested every day and goes to market during the night. Parsley is harvested every other day.

For diversification, a brother, Robert, has two greenhouses pouring out Anthurium blooms weekly for the Mainland market. In addition, a few thousand Bird-Of-Paradise blooms are cut from the soil-holding plants growing all around the rim of this high-producing ridgetop farm.

Director Narahara's father, Ginsaku, came to the Islands and settled on this piece of land 50 years ago, rented some additional land, and established a home where he raised 5 boys.

When World War II came along, it became necessary that either the land be bought or the Naraharas move. Iwao, the eldest son, bought the land. Shortly after the close of the war, intensive cultivation of the home place was started. Robert, second eldest, and the twins, Harold and Herbert, work along with Iwao and father Ginsaku.



The Narahara brothers in one of their lettuce fields. (left to right) Iwao, Robert, Harold, and Herbert.

Last summer Dad and Mother made a 6-month trip to the old home community in Japan.

Walter Narahara, third son, is at the University of Missouri studying food processing and handling.

As SCD Director Harahara says, "Land must be protected and managed if we expect to produce the food needed in Hawaii. We have only started; continued study will bring us much help. Our Soil Conservation District's way of doing the job has great possibilities."

—A. W. EMERSON

Hydraulic Research

The Supervisor of the Outdoor Hydraulic Laboratory Discusses Some of the Studies That Are Aiding Conservation Engineers in Solving Water Control Problems.

No. 24

This is the twenty fourth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By W. O. REE

THE early conservation engineer was a pioneer. He ventured into a new field of engineering with little or no precedent to guide him.

He was called on to build structures for soil and water conservation that differed considerably from anything he had built before. The conditions of size, cost, construction method, and materials used were outside the range of his previous experience. Yet, he knew that the basic principles of engineering would apply. What he needed in order to proceed with confidence was information on some of the untried conditions.

An example will illustrate this. Consider the design and construction of a channel to collect the water from a system of terraces and carry it safely downhill.

First, the quantity of water the channel may carry must be determined. Observations of actual runoff from similar areas are needed to arrive at the answer. Such observations together with studies of the effect of various factors, such as rainfall and land characteristics on runoff, belong in the field of hydrology, and will not be discussed in detail here. Past and current research in this field is providing some of the much-needed data.

Second, the size of the channel must be determined. This will depend on the quantity of water it must carry and on the speed with which the water will flow. This gets us into the field of hydraulics.

The speed will depend mainly on the steepness of the channel, the roughness of the channel surface, and the depth of flow.

The steepness of the channel can be measured readily. The depth of flow can be selected. The roughness of the channel surface, however, must be estimated. Such estimates are based on determinations made with flowing water in similar channels. The roughness of some of the materials considered for channel linings had not yet been evaluated and was not much better than a guess for our early engineer.

Third, the material used to line the channel must be selected. This lining must withstand the erosive force of the flowing water and protect the channel from damage. The speed of flowing water that can be permitted before the lining is damaged must be determined by experiments.

Our early engineer could have solved this problem by selecting a concrete channel lining, the performance of which was known. However, the concrete channel seemed unduly costly when compared with possible alternatives.

One of the alternatives was a grass lining that could be grown by the farmer. However, neither the roughness nor protective ability of grass as a channel lining had been precisely evaluated. Therefore, the engineer was reluctant to rely on grass to protect his channel until its performance could be predicted with some degree of certainty.

The great promise that grass seemed to offer as a channel lining made research, on its hydraulic properties, an early and urgent item on the research program. Some of this work has been done, and today the engineer can design

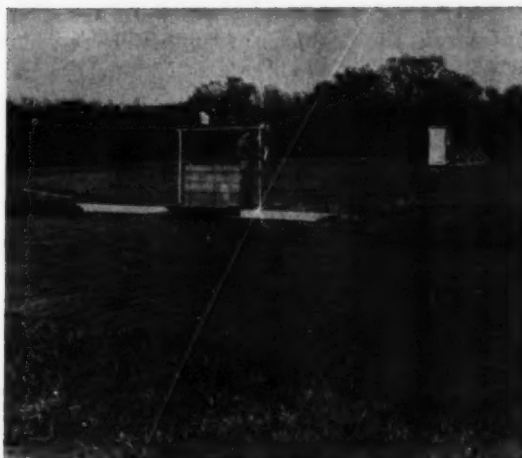
Note.—The author is project supervisor, watershed hydrology section, soil and water conservation branch, Agricultural Research Service, Stillwater, Okla.

and build grass-lined channels with greater confidence than ever before.

Research on the hydraulic properties of grass-lined waterways was first conducted at Spartanburg, S. C. This laboratory was replaced in 1941 by the Outdoor Hydraulic Laboratory at Stillwater, Okla., which is a joint research project of the Agricultural Research Service and the Oklahoma Agricultural Experiment Station.

Among hydraulic laboratories this project is unique. Ordinarily, hydraulic laboratories experiment with small models of the structure under investigation; but research on grass-lined channels requires that grasses tested be grown under natural conditions. The experimental channels must, therefore, be built to full scale. Large amounts of water are needed to produce the test-flood flows in these large channels. Furthermore, the test flows must be controlled in rate and duration and must be accurately measured. The Stillwater Outdoor Hydraulic Laboratory was designed to meet these requirements.

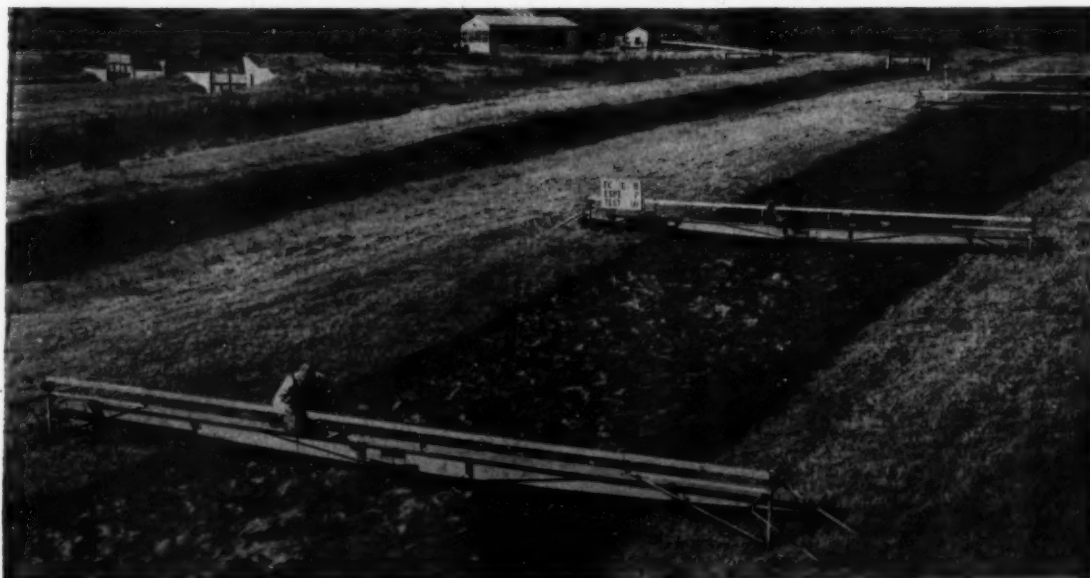
A large area of sloping land is available on which these experimental channels and structures can be built. The water for the testing is drawn from an adjoining lake through siphon outlets controlled by gate valves. Steady flows



The main supply canal in the foreground delivers water to the test pool of the outdoor hydraulic laboratory.

can be maintained that range from a trickle to 175 cubic feet per second, supplied through a large canal nearly a half mile long. The test structures lie downslope from the supply canal. A system of gates permits the quick diversion of water into or out of any of the experiments. Weirs and flumes are used to measure the rates of flow.

In addition to research on grass-lined terrace-outlet channels, the hydraulic laboratory has



Measuring the depth of flow in a bermudagrass-lined waterway at the Outdoor Hydraulic Laboratory.

worked on other soil- and water-conservation structures. The problems with these have been similar to those encountered in channel design and construction.

In determining hydraulic properties of grass-lined channels, the observers measure the depth of flow of a given amount of water at the selected stations, from which the hydraulic roughness of the channel lining may be calculated. Grasses having different heights, densities, and physical characteristics have different hydraulic roughnesses. Therefore, each physically different grass species must be tested in order to cover the range of conditions met in the field. Some of the grasses tested are bermudagrass, weeping lovegrass, King Ranch bluestem, split-beard bluestem, switchgrass, tall fescue, sudangrass, and native grass mixtures.

It was learned that the hydraulic roughness of a particular grass cover will vary with the depth and speed of the flow. This made the calculation of flow velocities in grass-lined waterways very difficult. However, a simple design method was devised which is described in a handbook¹ prepared by the laboratory.

The protective ability of a grass was determined by noting the soil and plant removal that occurred for different speeds of flow. In this

¹ Handbook of Channel Design for Soil and Water Conservation, USDA, Soil Conservation Service, SCS-TP-61, Washington, D. C., June 1964.



Velocity measurements being made in test channel with a concrete gutter down the center.



Test flow in a concrete trickle channel with bermudagrass along the sides.

way permissible flow velocities were determined for the various grasses.

It was found that sod grasses, such as bermudagrass, had the highest permissible velocities and gave the greatest protection. Very clumpy bunch grasses, such as weeping lovegrass, had the lowest safe speeds. This does not mean that bunch grasses cannot be used as channel linings. It does mean, that if used, the channel must be designed so the water will flow at slow speeds. This is done by making the channel very wide so the flows will be shallow. Values of safe flow speeds for various grasses and soils combinations are given in the handbook.

Under some conditions grass waterways are weakened by low flows of long duration. Snowmelt runoff extending over a period of weeks is an example. One solution to this problem has been the use of a small hard-surfaced gutter down the center of the grassed waterway. The grassed overflow portion provides capacity for flood flows. This arrangement is less expensive than paving the entire channel surface, but the durability of the gutter's edge during a flood flow was in doubt.

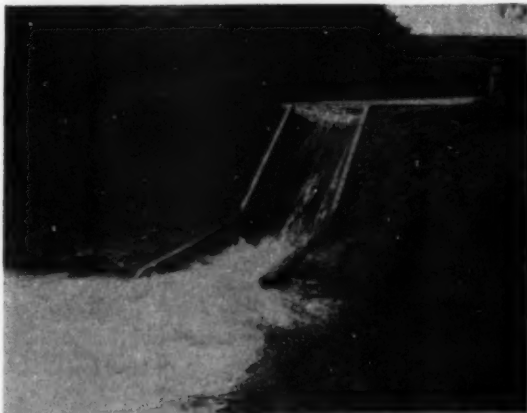
The hydraulic laboratory, therefore, tested a combination channel using two pitot tubes to measure the speed of the flow. From these tests it was learned that a heavy turf overgrowing the gutter's edge gave sufficient protection. Questions on how to calculate and predict the capacity of such combination channels were also answered by the tests.

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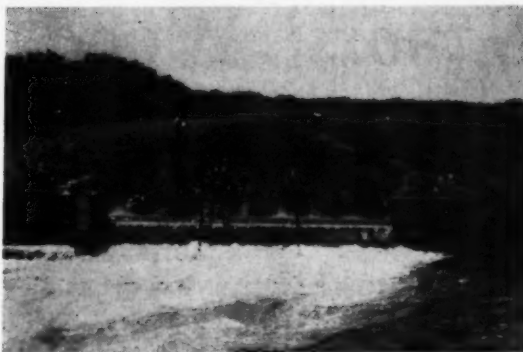
A chute structure was needed at the laboratory to return the waste water from the experiments to the nearby creek. To guard against excessive scour, a Saint Anthony Falls stilling basin, developed by Fred W. Blaisdell at the University of Minnesota, was placed at the chute outlet. The full-sized structure at Stillwater provided an opportunity to verify the results of the model studies under field conditions. These tests confirmed the predictions based on the model studies and gave the engineer added confidence in the efficiency of this stilling basin.

Conservation measures on certain lands of slight slope call for widely-spaced terraces of considerable length and channel capacity. Their size must be carefully considered in order to avoid excessive cost. The flow-retarding properties of various crops grown in terrace channels were determined accurately in 2 large channels, 600 feet long and 20 feet wide, built for this purpose. The crops were row-planted with the row direction parallel to the terrace and to the direction of the flow. At maximum growth, a flow of water was turned into the channel. The hydraulic elements were measured and the flow-retarding properties of the vegetation evaluated.

In these large terrace channels, the crop is seldom fully submerged by the flow, and surface roughness does not seem to be a satisfactory term to describe the property of flow retardance. Conservation engineers may write



Returning water to the creek after it has been used for hydraulic tests.



Water flow leaving a terrace test channel that is planted to Redlan kafir.

the author for results on the following crops: Hegari, 40 inch rows; Hegari, 20 inch rows; Redlan kafir, 40 inch rows; cotton, 40 inch rows; wheat, 7 inch rows; wheat, 14 inch rows; wheat, 7 inch rows transverse; and sudangrass, broadcast seeding.

Agricultural flood-prevention measures include detention reservoirs to hold back the flood flows intercepted by dams. This water may then be released from reservoirs through a pipe spillway. Many hydraulic problems are associated with the design of a pipe spillway. These concern not only the capacity of the pipe but the stability of the structure.

Answers to some of the questions were again sought at the hydraulic laboratory. A full-size replica of a typical pipe-outlet spillway was built on the laboratory grounds. It consisted of an entrance structure, a 24-inch diameter concrete pipe through the dam, a corrugated pipe elbow, and then a section of 24-inch corrugated pipe. The tests are being made to determine pipe friction-factor values, entrance-loss and elbow-loss coefficients, vibration factors, and effects of vortex action.

STUBBLE MULCHING FOR WHEAT YIELDS.—At the North Platte, Nebr. experiment station wheat yields averaged 27.4 bushels per acre for a stubble mulch system of summer fallow from 1950 to 1955. This compared with 24.8 bushels per acre where plowing and clean fallow was practiced.

—*Nebraska Experiment Station Quarterly*

Sanors' Woods

A Well-managed Woodlot in Ohio Has Been Producing \$15 Net Income Per Acre for 26 Years and Is Getting Better Year by Year.

By JOHN AUGHANBAUGH

ONE of eastern Ohio's outstanding farm woods is owned by the L. E. Sanor family in Columbiana County. More than 70 years ago the elder Sanor fenced a 20-acre woodland field to exclude livestock. Ever since, it has been carefully managed by father, son, and grandson, and is now an excellent sugar bush and sawtimber stand.

Records kept by the Sanors for 26 years show that the woodlot has yielded an annual net return per acre of \$10 from wood products and \$5 from maple syrup. These earnings were due to the Sanors' good methods of cutting, using, and marketing their forest products. Their

woodland produces, as it should, its proportionate share of the farm income.

Since 1946, a continuous inventory of sample plots made by the Ohio Agricultural Experiment Station has given an accurate yield record. Through sound management practices, including annual marking of trees for cutting, a good stand of high-quality trees is being built up.

Sanors' woods include sugar maple, beech, elm, basswood, tuliptree, red maple, and red oak. It is mainly a beech-maple stand, of all ages, from seedlings to sawlog trees. The soils on which the trees are growing are fairly good for wood production. Last year's inventory showed 7,525 net board feet to the acre. When fully stocked each acre should support 10,000 board feet.

The Sanors' program of light and frequent cutting permits young trees to grow and insures a profitable return from the same tract continuously. In other words, it is on a sustained-yield basis.

Since 1931, more than 120,000 board feet of timber came off this 20-acre woodlot. From 1946 to 1956, the yearly harvest per acre was 293 board feet—well below the net growth of 318 board feet.

Single trees, not always the largest, have

Note.—The author is research specialist, Department of Forestry, Ohio Agricultural Experiment Station, Wooster, Ohio.



Marking trees for selective cutting in Sanor's Woods.

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been cut selectively with a view both to markets and to future crops. The Sanors never hesitate to cut a tree in order to favor another of more potential value. Of the large trees, only the most vigorous ones, which are increasing rapidly in value, have been retained. The result is a larger, more frequent, and more profitable harvest.

These progressive farmers have always done their own woods work, and have used or sold all trees cut. They not only have earned more money but also have left their woods in better shape by selling sawlogs instead of standing trees. They increase their total farm-labor income considerably by doing most of the woods work during off seasons. Also, they make more efficient use of the power and equipment on the farm by their off-season operations.

The Sanors cut each felled tree into the highest quality products for which a market is ready or can be found. Their best logs go to specialty

buyers, often for basket veneer. Lower grades of timber supply the farm with building material, fence posts, and fuel wood.

Unused tops never clutter the ground in Sanors' woods. An average of 2 cords of fuel wood per thousand board-feet cut has come from topwood, defective trees, and thinnings. It is buzzed into firewood for the two farm homes, the sugaring operations, and for sale locally.

The know-how of growing wood crops underlies the Sanors' success. They know trees: how they grow, how to use them, and how to sell them.

Farming their woodland has a challenging appeal to the Sanors, for it is a profitable part of their farm business. They exercise the same energy and foresight in handling their wood crops as they do for corn, wheat, or other cultivated crops. They know that it pays.



CONTRACTORS SCHOOL—Tom Browne, SCS area conservationist at Statesboro, Ga., found that some soil conservation district cooperators in his area were not getting their Agricultural Conservation Program cost-sharing payments for engineering structures that failed to meet specifications. Many of these structures were built by contractors who simply did not understand the specifications. So, Browne invited a group of contractors to his office to give them a briefing on the new ACP specifications for dams and other structures. Five local contractors attended the meeting. They are seen above during a blackboard discussion with John Jackson, SCS engineer at Statesboro. The contractors are: (left to right) Bill Bradley, Hogan, Ga.; John R. Rushing, Statesboro, Ga.; C. F. Degenhardt, Millen, Ga.; W. D. Sands, Daisey, Ga.; and J. W. Arnsdorff, Springfield, Ga.

Pleasant Creek Is Again Pleasant

Inhabitants of the Valley Are Happy as Protection Work on a "Pilot" Watershed in Utah Nears Completion.

By HERB BODDY

WHEN the Mormon pioneers set up their townsite of Mt. Pleasant, along the banks of Pleasant Creek, in 1859, they were tipped off to floods by friendly Ute Indians. Watch out for "flash" floods, the Indians warned. But "bad medicine", or not, floods seemed a long way off to the settlers.

In the seventies and eighties the watershed's good grass was the feeding ground for cattle. Then came the sheepmen who grazed their herds on the green hillsides. After a time, the virgin grass thinned out. More and more bald spots showed on the steep slopes. Then came the severe drought of the early nineties that further depleted the grass.

From those days on the character of Pleasant Creek changed. Instead of a steady, yearly flow it has had a heavy spring flow and intermittent torrential summer flows. Settlers couldn't divert floodwaters for irrigation and there was little water on hand when it was needed. Irrigation systems and cropland were among the first to feel the impact of the new streamflow.

Upstream, on the watershed, and downstream things were happening. Well-stabilized stream beds became raw channels. Sheet and gully erosion cut into watershed slopes. Range feed thinned out. Soon, stockmen reduced their herds—some sold out.

It became clear to settlers and townspeople that without a good grass cover, to slow down runoff and store up raindrops, their watershed offered few safeguards.

With little advance warning, a cloudburst hit the community in June 1918. Most folks figured they were lucky to get off so easy—one life lost

and property losses of \$100,000. Three weeks later, a second devastating flood piled up more damage. In time, people got the debris cleared away.

Nearly 30 years passed before another "crusher" swept down from the deep Wasatch canyons. On July 24, 1946, floods were far from the minds of the people. They gathered in Mt. Pleasant to commemorate the settlement of Salt Lake Valley under leadership of Brigham Young. It was a warm, sunny day. Streets were brightly decorated and flags and bunting waved in a light breeze.

But, Mother Nature had other plans that day. In the afternoon, while farmers and townspeople watched a baseball game, thunderclaps



Contour furrowing and revegetation work in Pleasant

Note.—The author is information specialist, Soil Conservation Service, Berkeley, Calif.



Flood damage from the 1946 flood on Pleasant Creek.

echoed over the Valley. Black storm clouds settling over the watershed soon unloosed a down-pour, and one of the town's worst floods was on the way.

By 4:30 p.m., the time the gala parade was to begin, Pleasant Creek became a raging torrent, pouring mud, boulders and debris on farmlands and streets. Damage to business houses, utilities, homes, and farm properties ran well over \$100,000.

When a flood party checked the damaged

area, they found that flood control barriers, erected over the years, contained a huge deposit of rocks and other flood debris. Heavy debris never got over the spread-basin spillway. The deposits in the town came mainly from the clogged stream channel and raw creek banks.

That flood started local people to thinking and planning.

They took a big stride in making their watershed safe when the Sanpete Soil Conservation District took over sponsorship of the 21,000-acre watershed project 3 years ago. Their project became one of 58 "Pilot" small-watershed projects for which Congress appropriated flood-matching funds.

Soon the watershed project became more and more a community enterprise as local groups and organizations volunteered help of various kinds. The Sanpete District Board welcomed these supporting organizations as co-sponsors. Organized as the Pleasant Creek Watershed Protection Committee, the co-sponsors worked as a steering group to see the watershed work through. The committee included representatives of Sanpete Soil Conservation District; Mt. Pleasant City Corporation, Sanpete County; Pleasant Creek Irrigation Co.; Pleasant Creek Highland Irrigation Co.; Coal Fork Irrigation Co.; farmers and ranchers within the watershed; Denver and Rio Grande Western Railway Co.; Utah Agricultural Extension Service; Agricultural Conservation Program Service; Utah State Highway Commission; Utah State



ets work in Pleasant Creek watershed.



Eroded hillside on Pleasant Creek watershed before land-treatment measures were installed.

Fish & Game Department; Utah State engineer; Forest Service; and Soil Conservation Service.

The watershed protection program, now nearly completed, is a combination of soil- and water-saving practices plus a system of flood-preventing structures. Cost of the works will total more than \$400,000, half of which will be shared by private and non-Federal interests and the rest by SCS and FS.

The best way to view flood-protection measures installed over the watershed is from the air. Next best, is to take one of the tours conducted off and on during the year by the water-

shed committee. Several hundred people have toured the project so far.

On the way to the upper watershed you will pass several thousand acres covered with rock and other flood debris that was once good cropland. You are told that this land turned out bumper yields around 1900. Homesteaders left the lands when the floods became too frequent. Now the lands are marginal, providing only light, spring grazing.

At the mouth of the canyon, below the confluence of the South, North, and Straight Forks of Pleasant Creek, is a large, 50-acre spreading or debris basin, diked up at the end overlooking the town. You learn the dike has been raised several times in the last 20 years. SCS engineers Bob Rollison and Gordon Hansen, can point out the "splitters" and "spreaders." These large rock buffers have the job of stopping mud-rock from going over the spillway and on downstream.

Silt and debris from future storms will be screened and stored in this basin, leaving only muddy water to flow on. Cleaning, deepening, and widening of the stream channel is next in order before the creek can carry a full flood flow.

In the upper reaches of the watershed, which includes lands of the Manti-LaSal National Forest, the Forest Service has taken steps to slow runoff and improve grass cover.

Some of the steepest and most eroded slopes were contoured, terraced, and reseeded, thus speeding up Nature's mending job. The contour



Debris basin dike in the upper Pleasant Creek watershed.

trenches break up the gully system, prevent erosion, and slow down runoff, thus reducing peak flood flows.

To round out the project, farmers and ranchers—cooperators of the district—are doing their share by carrying out soil- and water-saving practices on their acreages.

Dave Jorgensen, city councilman and chairman of the joint watershed committee, is enthusiastic about the watershed's development.

"I think we've got things about licked now," he said recently. "The amazing thing about this project, as I see it, is that it is a team job, set up and managed by the people themselves. Lots



"Splitter" designed to spread flood flows in upper debris basin of Pleasant Creek.

of people pitched in to help make the plan click. One thing is sure, we would have had a mighty tough time of it without the people's help and the assistance of such agencies as SCS and FS.

"You know we got a real scare only a year ago when a midsummer cloudburst sneaked up on us. Our watershed project was only about 25 percent completed then, but the spreaders and splitters piled up debris and boulders just as we hoped they would.

"When debris reached the upper-spreading dam it slowed down. And when that mass of debris stopped, it set off a chain reaction. A pile of rock 5 to 8 feet deep jammed the channel for nearly a half mile upstream.

"At the same time, although only partly completed, the special-purpose terraces, seedings, and gully plugs in the upper reaches, were at work too. They helped keep water on the land where it fell."

And Mayor Grant Johansen of Mt. Pleasant, says, "Our watershed project will conserve soil and water and protect us from damaging floods.



Emergency spillway of a floodwater retarding and debris-collecting dam on upper Pleasant Creek.

Our people feel safer now that the watershed work is nearly done."

You would think the Sanpete District Board would take things easier now that the Pleasant Creek project is about set. Instead, it begins to look more and more as if the board's activities in watershed-protection work are just beginning. Board chairman, Elden Westenskow, explains that the district already has received requests to sponsor watershed programs at Fairview, where Birch Creek has been kicking up, and on Tids Canyon, at Ft. Green, Chester, and Spring City.



Outlet and diversion structure from upper debris basin that divides water 16 ways for irrigation ditches.

A Year of Progress

PROBABLY the most significant development in the program of the Soil Conservation Service the past few years has been the enlarged scope of its activities. As more and more individuals have come to realize that their conservation problems, especially their water problems, could not be solved effectively through individual action they have sought to solve them through community action.

Prior to the 1950's, the main emphasis of the Service's program was on the planning and execution of coordinated conservation programs for individual farm and ranch units. That emphasis has been enlarged in recent years to encompass programs for entire watersheds or other problem areas. This does not mean taking a new approach to the problem: It means, rather, that the emphasis has been broadened.

The same principles of proper land use and soil and water management are as valid now as they were 10 or 20 years ago. These principles are still the guiding influence toward accomplishment of all Service objectives, whether on individual farms or ranches or on watersheds or problem areas.

The watershed or community approach is not new. The first demonstration projects of the Service were established mainly on a watershed or problem-area basis more than 20 years ago. But the recent trend indicates that more and more communities are now requesting and receiving aid on community or watershed problems. In addition, individual farmers and ranchers are requesting and receiving aid on a wider variety of soil- and water-management problems.

When the Service was first established, its main effort was to aid farmers and ranchers in controlling soil erosion and conserving the water that fell on their fields and pastures. This program was broadened to include soil improvement and soil building. Improved irrigation and drainage methods were added, at the direc-

tion of Congress, as essential parts of the conservation program. Flood prevention through upstream engineering structures was added. Management of land and water for wildlife also became important.

And, through all this development, the problem of using land to fit its capabilities—the conversion of less productive land to grass or woods, and the shifting of high-quality lands from grass or woods to cropland—was of paramount importance to the efficiency of agriculture.

In the meantime, another problem of land conversion confronted us—the urbanization of productive farmlands. During the past decade the urbanization movement has consumed—in suburban homesites, highways, airports, factories, military installations, and other urban developments—more than twice as much productive farmland as has erosion and all other forms of soil depletion brought about through improper farming and grazing methods.

Also, through the past few years there has been the problem of farm surpluses. American farmers and ranchers with their modern equipment and soil improvement practices were producing more than was needed by the Nation. Yet, droughts and floods continue to plague us. The problems become more complicated year by year. And the obligations of the Service become more extensive and complicated each year.

By the end of 1956 the Service was administering or cooperating in 10 different programs. These included: The national soil survey; assistance to soil conservation districts and their cooperators on a wide variety of conservation problems; flood prevention activities on 11 authorized watersheds; watershed treatment on 58 pilot watersheds; watershed protection on numerous other small watersheds under provisions of Public Law 566; the long-range Great Plains Conservation Program; and providing technical assistance on the Rural Development Program, the Agricultural Conservation Program, the Soil Bank Program, and the

Note.—This article is excerpted from a report of the Administrator of the Soil Conservation Service to the Secretary of Agriculture. Statistics are for calendar year, 1956.

Conservation Loan Program administered by the Farmers Home Administration.

Most of these programs require a high degree of local leadership for successful and efficient development and execution. The Service has received gratifying cooperation from many types of local organizations including County ASC Committees, farmers' organizations, civic clubs, specially organized watershed associations, and numerous other groups. In most communities, however, soil conservation districts have furnished a great deal of the local initiative and leadership needed for development of the various projects.

SOIL CONSERVATION DISTRICTS

Farmers and ranchers organized 66 new soil conservation districts during 1956. New districts and additions to old districts covered about 58 million acres. This made a total of 2,744 soil conservation and other conservation districts covering about 1,565,000,000 acres in the United States and Territories. About 91 percent of all farms and ranches and more than 87 percent of all farmland of the Nation are now included in locally organized and locally administered districts.

The Soil Conservation Service signed supplemental memorandums of understanding with 48 newly organized districts during the year. At the end of 1956, the Department and SCS were assisting 2,725 districts. Cooperating with those districts were more than 1,686,000 farmers and ranchers operating more than 500 million acres. The districts reported 123,942 new cooperators with nearly 40 million acres of land during 1956.

SOIL SURVEYS

Soil surveys suitable for farm planning were completed on more than 33 million acres during 1956, an increase of nearly 10 percent over the previous year. In addition, range site surveys were completed on more than 12 million acres. At the end of the year surveys suitable for farm and ranch planning had been completed on more than 527 million acres.

Work plans for converting other surveys to standard soil surveys were completed for 307 areas. Most of the surveys are now being mapped on a progressive or block basis to gain more uniformity in the mapping and increase the efficiency of survey parties.

Considerable progress was made last year in conversion of mapping legends to meet requirements for standard soil surveys. Work on the comprehensive scheme of soil classification was continued. Progress was made in the selection of key soils on which full soil interpretations will be made. Emphasis is being placed on relating kinds of soil to kinds and amounts of vegetation (wood crops and range) that can be grown.

Sixteen soil survey reports with accompanying maps were published. A study was started on small-scale soil

maps, including problem area maps, for counties and States of the United States.

Cooperative studies on the relations of soils to the nutritive value of feeds they produce were continued with emphasis concentrated on the cobalt and molybdenum content.

Considerable progress was made in obtaining aerial photography for areas where existing coverage had become obsolete due to cultural or land-use changes. Ten aerial survey contracts involving 50 areas with more than 20 million acres were active during the year.

FARM AND RANCH PLANNING

The Service assisted more than one million farmers and ranchers in planning or applying some parts of their conservation programs during 1956. Basic conservation plans were developed with 90,572 farmers and ranchers whose lands covered more than 27 million acres. Basic plans were revised on another 10,000 farms and ranches that included more than 4 million acres. At the end of the year 1,138,833 active cooperators with soil conservation districts had basic conservation plans on about 318 million acres.

Service personnel in 1956 provided technical assistance in planning and laying out 2,400 group drainage jobs and 929 group irrigation projects that affected more than 4 million acres.

During the past 5 years more than 1½ million acres were converted each year from cultivated crops to grass and trees on farms and ranches serviced by SCS. Partially offsetting the conversion of cropland to other uses is the conversion of about one-half million acres of certain lands to cultivated crops each year. Thus, the net reduction in cropland through long-term conversion averages about one million acres per year.

Progress was made in improving the quality as well as the quantity of farm and ranch plans in most districts. A wider use of the progressive planning system was responsible for some of the improvement. Also, better "follow up" in assistance to cooperators and revisions of technical guides helped.

CONSERVATION APPLIED TO THE LAND

Weighted averages indicate that about 5.5 percent more conservation work was applied to the land by soil conservation district cooperators in 1956 than in 1955. This progress was made in spite of the continuing squeeze between declining farm prices and rising costs of production and seriously curtailed conservation activities in some communities because of drought.

Progress in soil conservation is not necessarily measured by the extent to which individual conservation practices are used. A basic conservation program must be predicated on the supposition that all land will be used within its capabilities and treated according to its needs. However, conservation farming is done mainly by land-use adjustments and by applying the various conservation practices needed to each tract of land. Hence, progress may be determined, to some extent, by measuring the amounts of certain important practices that have been applied to the land.

The following table summarizes the application of some of the most commonly used conservation practices for the Nation as a whole.

Newly applied conservation practices in soil conservation districts, with SCS assistance, 1956.		
Contour farming	acres	2,912,960
Cover cropping	"	3,738,053
Strip cropping	"	977,428
Stubble mulching	"	2,599,973
Range and pasture seeding	"	3,254,504
Tree planting	"	367,130
Improvement cutting	"	1,102,479
Wildlife area improvement	"	411,397
Drainage	"	1,452,989
Land leveling	"	575,023
Improved water application	"	1,611,836
Waterway development	"	85,873
Terracing	miles	57,628
Farm and ranch ponds	number	87,430

A National inventory of soil and water conservation needs was started during the year. Seven other agencies of the Department are assisting the Service in planning and executing this project. It is expected that the inventory, on a county by county and State by State basis, will be completed during the next 3 years.

WATERSHED PROTECTION AND FLOOD PREVENTION

Applications for Federal assistance on small watersheds, under provisions of Public Law 566, continued to come from local organizations throughout the Nation. During the year, 193 applications were received, making 617 from 46 States that had been received by December 31, 1956. Of these applications, 106 were approved for planning during the year, bringing the total to 229. Thirty-one of the small watersheds had been approved for operations and work was getting underway at the close of the year.

During the 1955 and 1956 sessions of their legislatures, 25 States passed new or amended legislation to further cooperation between local, State, and Federal agencies in carrying out activities under Public Law 566. In all, 45 different laws were passed in the 25 States. Legislatures of 5 States provided for State financial participation in the small watershed program.

Operations continued at a satisfactory rate on the 58 pilot watersheds established in 1953. Installation of works of improvement were more than 90 percent completed in 8 of these watersheds. During the year, 78 floodwater-retarding structures were completed, 113 stabilizing and sediment-control structures were built, 52 silt and debris basins constructed, and 43 miles of channel stabilization and improvement completed. This brings the total of structural work in the 58 pilot watersheds to: 197 floodwater-retarding structures; 1,427 stabilizing- and sediment-control structures; 166 silt and debris basins; and 123 miles of channel improvement

and stabilization. Land-treatment measures were keeping pace with the structural measures in most of the pilot watersheds.

Work plans were developed for 88 subwatersheds in the 11 flood-prevention watersheds started in 1947 under the Flood Control Act of 1936. This makes 278 subwatersheds, including more than 15 million acres, on which work plans had been developed at the end of the year. Both the structural work and land treatment progressed at a satisfactory rate. During the year, 82 floodwater-retarding structures were completed, 1,527 stabilizing and sediment-control structures were built, and 149 miles of channel improvement and stabilization accomplished. Total structural work in these 11 watersheds now includes: 431 floodwater-retarding structures; 5,962 stabilizing and sediment-control structures; 244 silt and debris basins; and 974 miles of channel improvement. About 25,000 acres of critical areas in these watersheds had been revegetated at the close of the year.

The Service obtained accurate snow pack information on more than 900 snow courses in the western States in the cooperative snow survey. In addition, information obtained from British Columbia on the snow pack of the upper Columbia River was made available as a part of the spring runoff prediction.

Cooperation was continued with other Federal agencies, especially with the Army Corps of Engineers and Bureau of Reclamation, on river basin investigations and planning. The river basin projects receiving most attention during the year were the lower Mississippi River, the Delaware River, and the upper Colorado River.

ASSISTANCE ON RELATED PROGRAMS

The Service continued to assist participants in the Agricultural Conservation Program at the request of county ASC committees. Last year most SCS assistance was given on permanent-type practices that should provide enduring benefits to the land. More than 558,000 ACP referrals from 464,000 farms and ranches came to SCS from ASC committees.

Field technicians counseled about 42,000 farmers and ranchers on conservation reserve and acreage reserve problems in connection with the Soil Bank Program. The Service also gave conservation assistance in the Rural Development Program and to the Farmers Home Administration and its farmer-clients in the soil and water conservation loan program. During the year, FHA insured loans for more than 12 million dollars to individuals and organizations for such purposes.

A new program that was shaping up rapidly as the year closed was the Great Plains Conservation Program, authorized by Public Law 1021. Secretary Benson assigned Department of Agriculture leadership to the Soil Conservation Service. This involves coordinating and making available to people in the Great Plains those facilities—technical assistance, cost sharing, and others—of the Department that can help them establish the land-use adjustments and conservation measures needed to stabilize agriculture in that region.

PLANT TECHNOLOGY

Increased attention was given to Service activity in plant technology. National policy in this field was crystallized during the year by administrative statements, including policy on range conservation and objectives and policies in biology. Policy statements on plant materials, agronomy, and woodland conservation were drafted.

Several significant developments resulted from the observational work with plant materials: *Zoysia* proved useful in grass waterways; *Wichuria rose* in holding gravelly stream banks; annual brome as orchard cover; and big trefoil as a legume on poorly drained lands. Special techniques were developed for increasing survival of conifers in field plantings.

A joint memorandum between the Service and the Fish and Wildlife Service served to correlate work of the two agencies. Among other provisions the Service will transfer funds to the Fish and Wildlife Service for biological surveys on two watershed projects.

ENGINEERING

Recruitment and training of engineers, especially in hydrology, geology, structural and hydraulic design, irrigation, and drainage, continued to receive major emphasis due to the limited supply of qualified men in these fields.

Cooperation was continued with other Federal agencies on sedimentation studies. The cooperative studies between SCS and the Geological Survey on the trap efficiency of floodwater-retarding structures received emphasis.

National standards for the installations of plastic, concrete, and metal irrigation pipelines were developed in conjunction with the plastics industry, concrete pipe associations, and steel plate fabricators. The uniform standards developed with these organizations should greatly facilitate technical problems of installation. Furthermore, the acceptance of the standards by industry should assure general acceptance by contractors and dealers involved in such installations.

The continued expansion of irrigation into the eastern humid area of the country brought up many technical problems. The expansion of surface irrigation into this region necessitated revisions and additions to some of the original irrigation guides and preparation of a new booklet on "Conservation Irrigation in the Humid Areas."

Drainage operations, especially in the coastal plains, continued at a high level. In line with the Department's policy, the Service curtailed all assistance on drainage where the primary purpose was to bring new land into cultivation.

Studies of parallel terracing were continued in several States. The idea has been found adaptable in all States where trials were made. Farmers who have tried parallel terraces praise them highly because of the greater ease of farming.

Attention was given to the smoothing of field surfaces prior to construction of terraces. The greatest need for smoothing is on fields where old terraces are

to be replaced with new ones. Smoothing also is desirable on many fields of irregular topography where new terraces are to be installed, especially if parallel terraces are to be used.

The further development of working relations with manufacturers, distributors, and retailers of farm equipment was continued.

A contract was entered into for use of an electronic digital computer to compute cross sections for plotting water-surface profiles. This has been of special importance in designing floodwater-retarding and other water-impounding structures.

Permission was obtained to negotiate contracts for engineering work with private engineering firms. Although more expensive, this use of private engineers may make it possible to supplement Service engineering staffs in some localities where the need is acute.

Livestock Pond With Wildlife Island

By BJORN DAVIDSON

A COMBINATION stockwater pond and wildlife area was desired by Fred P. Steuerwald on his 640-acre farm west of Huron, S. Dak. And that is what he built.

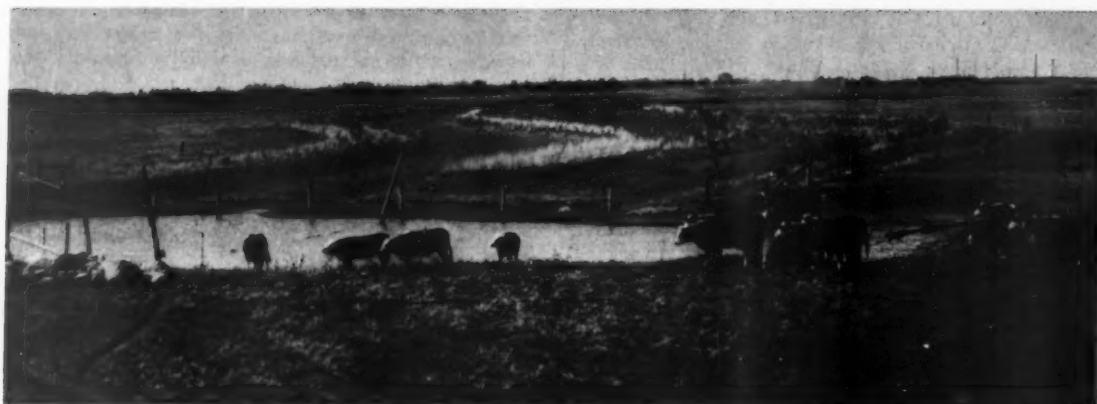
A swale runs through Steuerwald's farm, fed by runoff from an adjacent farm as well as his own. Steuerwald watched the water flow across his land for years. He wanted to store some of it for his livestock and also for the benefit of wildlife.

In 1952, he called on supervisors of the Beadle County Soil Conservation District for assistance in constructing the pond. When Soil Conservation Service technicians, assisting the district, were laying out the pond, Steuerwald discussed the possibility of dredging the swale to create an island in the center of the pond.

Surveys showed that when the stockwater dugout was full, sufficient water would be backed up to provide a stable supply for wildlife on both sides of the island for a distance of a quarter of a mile.

Steuerwald hired a contractor to dig out the swale and deposit the fill in the center to form an island that would have water 3 to 4 feet deep on both sides. This work cost him more than \$1,000.

Note.—The author is work unit conservationist, Soil Conservation Service, Huron, S. Dak.



Stockwater and wildlife pond on the Steuerwald farm.

He fenced the wildlife area to exclude livestock. The district supplied him with tall wheatgrass seed to plant on the island and disturbed areas, as well as willows and cottonwoods to plant along the waterline.

"Today, I have a haven for wildlife," Steuerwald reports. "Pheasants and partridges are nesting in the cover on the island, while ducks nest in the fenced area."

"Now, only about 600 feet from the busiest highway in the State, we have various types of wildlife as well as a year-round recreation spot for the children in the neighborhood. And, inci-

dentally, there are 8 broods of duck on the pond this year," he declares.

Steuerwald also uses other soil and water conservation practices. He has fenced his pastures so that livestock grazing on any of them has access to the pond. The first wind stripcropping in Beadle County was established on this farm by Steuerwald in 1935, and all strips are fenced for grazing. He practices crop rotations, and has established a farmstead windbreak. All drainage on the farm goes into the wildlife area.

Steuerwald was a winner in the Greater South Dakota Associations' conservation contest in 1953.

Bentonite "Swell"

Bentonite Proves to Be One of the Cheapest, Satisfactory Products Found for Lining Leaky Irrigation Ditches.

By BRICE F. LEE

MOST irrigation farmers have long known that from 10 to 90 percent of their water might be lost from leaky ditches between the headgate and the farm. Many farmers are now combating these terrific and costly losses by lining ditches with bentonite, a colloidal clay.

When it is mixed in the correct proportion

with water, this clay will swell up to fifteen times its dry volume. This property makes it valuable for ditch linings.

The process by which bentonite stops ditch seepage is as old as flowing water itself. Irrigators know that leakage losses of ditch water are greater with clear water than they are with muddy water. The silty material found in muddy water settles out on the bottom of ditch beds,

Note.—The author is soil scientist, Soil Conservation Service, Durango, Colo.

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seals the cracks and crevices, and stops much of the seepage loss. The chief disadvantage of the silt layer as a ditch lining is that it is exposed to the flowing water and it cracks when dry.

Bentonite's action closely resembles the action of the mud in muddy water. The extremely fine bentonite clay particles are suspended in water during the lining process. The water carries these particles and where the water goes, so goes the bentonite. As the suspension flows through cracks and crevices, the bentonite particles collect, layer upon layer, until the leaky spots are sealed. The actual bentonite lining process takes place below the surface of the channel. This makes it more resistant to the flowing water.

It is true that the conventional linings, such as concrete, are effective. But they have disadvantages, the chief one being their high cost. Bentonite is relatively inexpensive. One can line 7 miles of ditch with bentonite for the same amount of money it takes to line 1 mile with concrete.

Another advantage of bentonite over the conventional linings is its ease of installation. The installation is convenient since the waterflow needs to be interrupted for only a short time. The small amount of equipment needed is simple and economical. A section of the ditch is dammed off, bentonite is mixed in the water, and the water carries it to the spots which need lining. This eliminates the expensive and time-consuming problem of locating the permeable sections of the ditches.

Excavations, which are necessary in most other ditch-lining projects, are eliminated when using bentonite. Bentonite linings take no more time or effort than cleaning a ditch or canal. You save both time and money. It means more time on your hands and more dollars in your pocket.

In addition to saving water, bentonite linings are used advantageously in saving land. The land in some areas is slowly being ruined by too much water. Leakage from ditches and canals causes the land nearby to become seepy—thus putting good land out of production. The water table under certain of these areas was lowered from 1 to 3 feet after the channels were lined with this colloidal clay.

What is involved in lining a canal with bentonite? Two methods are currently being used: the full-flow method and the ponding method.

The full-flow method works well in small canals and ditches and in those where waterflow can be interrupted for only a short time. The only special equipment needed in this operation is an air compressor.

The first step in the full-flow procedure is to turn the water out of the ditch and clear the ditch of weeds. Dry bentonite is then placed at the head end of the ditch in a foot-thick layer, and a check dam is put in just below the layer of bentonite. The water is turned in and allowed to fill the ditch and flow over the check dam.



Dumping Bentonite into a ditch where water has temporarily been cut off.

The layer of clay is "muddied up" by jetting compressed air into it. The action of this compressed air creates a suspension of bentonite particles in the water. The clay-water mixture flows downstream and seals the leaky sections of the ditch on its way.

The ponding method is suitable for lining larger canals where check structures are already available. The bentonite and water are mixed together at the head of the canal. The mixture is allowed to fill the first section of the canal and flow over the check dam into the next



Air compressor is used to muddy water after Bentonite has been placed in the ditch.

section, and so on, until the entire length of the canal has been lined. Canals up to 12 miles in length have been lined by this method.

Researchers, who are currently conducting bentonite research projects, are obtaining very satisfactory results. However, they do not claim that bentonite linings are a cure-all for seepage troubles. There is no one cure-all. The commonly used conventional linings have their limitations, too.

Problems relating to the use of bentonite ditch linings are being solved rapidly, but a large one still exists. Bentonite linings need to be adapted to all the soil types through which ditches and canals run. Current research is being directed toward this problem. Bentonite-lined canals running through sandy and loessial soils have produced the most satisfactory results to date. Less favorable results were obtained when canals ran through rocky and gravelly soils.

Even though difficulties have arisen in its use, bentonite still remains a "SWELL" friend to irrigation.

LUMBER PRODUCTION.—The nation's sawmills produced 37.5 billion board feet of lumber during 1956, enough to build about 3.8 million three-bedroom homes, according to the National Lumber Manufacturers Association.

KIWANIS INTERNATIONAL.—The Committee on Agriculture and Conservation of Kiwanis International has taken for its theme in 1957: "Promoting Agriculture and Conservation Is A Year-Round Job." The first objective suggested by the committee is: "Participation by every club in agriculture and conservation projects—completing at least one project each quarter."

BANKER ADVISES CONSERVATION

A Retired Banker Considers Soil and Water Conservation an Investment That Will Pay Dividends and Also Improve the Land for Future Generations.

By JOHN M. CRÖSS
and PHILIP K. CORNELISON

HOGAN Jackson of Albertville, Ala., advises every young man who owns land to practice soil and water conservation. His advice stems from experience. He owns land and practices soil and water conservation. He also believes in doing the job quickly and thoroughly.

Mr. Jackson spent a large portion of his 84 years in the banking business. He established the Albertville National Bank in 1904 and served as its president for 40 years. He helped establish 2 other banks in neighboring towns. During the past few years he has been looking after his farms and other interests while his son serves as president of the Albertville Bank.

Soil and water conservation to Banker Jackson is an investment. It increases the value and improves the productive capacity of the soil. It also pays good dividends. But Mr. Jackson has

Note.—The authors are, respectively, work unit conservationist and farm planner, Soil Conservation Service, Marshall County, Ala.



Hogan Jackson (left) and SCS Technician inspect terrace construction.

another motive: "I want to leave the land a little better than I found it," he says.

He began his conservation work on his 325-acre farm near Albertville with technical assistance given him by SCS technicians working with the Northeast Alabama Soil Conservation District. Early in 1956, he made a soil and water conservation plan for the farm that spells out a step-by-step approach. He started immediately putting the plan on the land.

During the first year Mr. Jackson was able to make most of the needed land-use changes and apply most of the conservation measures planned. He expects to finish the job, except for maintenance, during the next year.



Newly constructed grass waterway on the Hogan Jackson farm.

The Jackson farm now has 15 newly sodded grass waterways. More than 12,000 feet of terraces have been constructed, and another 40,000 feet are under construction. Most of them are laid out parallel. He has cleared and planted to tall fescue and clover a wet field that was not producing. And, of course, an approved rotation is practiced on each field.

Six acres of field borders frame each field on the farm. The borders are about 20 feet wide near roads and fences and planted to grass and clover. In addition to checking erosion, these borders serve as turnaround areas for machinery. Near the woodlands, the borders are about 30 feet wide and planted to bicolor lespedeza to furnish food and cover for game birds.



Selective cutting of woodland on the Jackson farm.

His woodland-management program is well underway. Most of the pine trees have been thinned according to the D + 6 formula. The hardwood cull trees are rapidly being cut. He has planted 12,000 pine seedlings and plans to plant 40,000 more next fall.

A newly constructed pond with 2½ surface acres is already furnishing water for livestock and will be stocked with fish.

The Agricultural Conservation Program and Soil Bank have helped share the costs for many of the conservation practices. Yet, Mr. Jackson has a considerable initial investment in the work. He thinks, however, that the dividends from the investment will soon amortize his capital outlay.



Newly completed farm pond on the Hogan Jackson farm.

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THE FARMER AND HIS CUSTOMERS. By Ladd Haystead. 92 pp. Illustrated. 1957. Norman: University of Oklahoma Press. \$2.75.

In this small book, Ladd Haystead comes to the defense of farmers. He points out how much blame the farmer has to take for current high prices of food. He discusses such questions as: Why are many farmers going broke while food prices are continuing to rise? Are urbanites justified in being critical of farmers for accepting government subsidies at this time? Is it necessary that the business of farming be sound to keep the country prosperous?

The author points out that with the continual rise in food prices, the farmer's share of the returns is becoming less and less. He thinks the urban housewife does not realize that this is largely caused by increased wages demanded by city people for transporting, processing, and preparing these products. In the meantime, the farmer's cost of living is necessarily increasing as is that of the rest of us. It is his decreased returns and increased costs, since the development of the war-expanded farm plant, that has caused rural distress, surpluses, and government financial assistance.

Such a situation may have serious repercussions in the future, according to the author. Farming is the second largest industry in the country and needs to be integrated properly into the national economy. This book examines the position farming has today, its problems, its weaknesses, and its place in the United States of the future.

The book is well written. Its style is informal and easy to read. It should appeal to many different groups of readers.

—THEODORE A. NEUBAUER

TREE PLANTING BOOMS.—From 77,000 trees in 1953 to more than 300,000 in 1956!

That's how the interest in farm woodlands has spurted in the Caledonia County Soil Conservation District in north-central Vermont. Tree planting is of special importance to farmers in this district. Much of the land is unfit for cultivated crops or meadow but it produces excellent softwood. Tree planting is returning this land to its best use.

For years, even after the district was formed in 1946, nothing was done to use the many sloping fields that had become too played out to grow good hay or any other crop. Up to 1954 only 157 acres had been restored to woodland.

In 1954, Ken Danielson took a look around. He was then the technician in charge of Soil Conservation Service work in the district. He figured it was time to do something about making all the idle land—even abandoned farms—useful again.

Why weren't farmers planting trees? Danielson talked the matter over with the district supervisors, Paul Reed, the county forester, Phil Grimes, the county agricultural agent, and others. They found that the State nursery could provide trees at a fair price. The State Forest Service was glad to transport the seedlings. Technicians were ready to show farmers how the planting should be done.

What was the drawback? It was the old-fashioned handplanting.

So the district bought a tree-planting machine. The district supervisors also arranged for a local man to furnish a tractor and a two-man crew to operate the machine. Then the district's tree-planting service was offered to cooperating farmers.

Interest in tree planting quickly took a spurt. Before long the district had to buy another tree-planting machine to meet demands.

Of course the machine can't be used on really steep hillsides. These are still hand-planted. But it's the machine planting that's responsible for the boom. It was the supervisor's foresight in providing the machine that turned the tide, farmers say. Supervisors responsible for the boom were John E. Somers, Clarence Burrington, Paul Nelson, Joseph Menard, and Kenneth Ward.

The farmers are more than satisfied with the district's tree-planting service. They're enthusiastic. One farmer alone, Clarence Ackley, in 1956 planted almost 100 acres of abandoned farmland.

—ALLEN R. GRAY